

Bank Note Company on Broad Street.

The goal, says Weisbrod, "is the ability to create a seamless life, where you can work a five-minute walk from your home. That is what I think the urban center of the twenty-first century is going to be about."

Twenty-five Broad, the former home of Paine Webber, is the first building to begin conversion since the tax incentives were signed into law in October. A turn-of-the-century tower, its entrance framed by massive columns, the Exchange (as Crescent Heights, the developer, calls it) will be a 350-unit "luxury" rental building.

Adaptive re-use of handsome prewar buildings is by now routine. More intriguing is the possible conversion of newer buildings, such as 60 Broad or 127 John (at Water Street, the one with the conceptual clock), because it is jarring to think that the brand of efficiency and modernity these buildings represent has so quickly grown obsolete.

IN THE CITY MIDDAY DRUG AND CHEMICAL Club, a dining club on the fiftieth floor of the Midland Bank building, sits Joseph Pell Lombardi, gazing out the big windows. He's an architect who has spent his entire career converting old office and industrial buildings into residences. Lombardi is a

gracious man who collects Statue of Liberty models and oil paintings of ocean liners. When it comes to converting office towers into apartments, he is all bravado. We contemplate the U.S. Steel Building (a.k.a. 1 Liberty Plaza), a fat black tower erected in 1974 that has never quite recovered from the flight of Merrill Lynch across West Street to the World Financial Center. But even if it were entirely empty, it's not the sort of building most people would consider converting, at least not anytime soon. It is simply too seventies. Lombardi says he once did the drawings for such a scheme and "it laid out better than you'd think." True, the deepest portions of the apartments were 50 feet from any window, but, Lombardi reasons, that's no worse than in many SoHo lofts.

Then there's the World Trade Center. The Port Authority, which is considering selling the complex, contacted a number of real-estate brokers in an attempt to assess its value. One of the brokers asked Lombardi to play with the idea of conversion. "I took a preliminary look at the layout. Sure enough, it could be done," says Lombardi.

The notion of turning these eighth-wonder-of-the-world monoliths into something as mundane as apartments is very seductive. After all, it's becoming evident that

such buildings may soon enough be as quaint as the former warehouses and factories that stylish people now call home.

Donald Trump recently purchased 40 Wall Street, a 1929 pyramid-topped tower that once housed the Bank of the Manhattan Company. Like 60 Broad, this building fell victim to history's mean sense of humor; it was part of Ferdinand Marcos's extensive real-estate portfolio. Rumor has it that Trump is going to convert 40 Wall into apartments, but he claims he's going to restore it to its rightful place as "the best office building in downtown Manhattan."

"I think that Wall Street is far and away the most romantic part of New York," Trump tells me. "The Stock Exchange, the history, the bells, the whole thing."

Inspired by Lombardi, who wrote a master's thesis about turning the Chrysler Building into an apartment house, I toss out an idea. "How about the Empire State Building?" I ask Trump. Why not? Why not turn the most famous skyscraper in the world into the world's tallest luxury condominium (assuming that the Port Authority or the Malaysians don't do it first)?

"Isn't that an interesting one, though," Trump muses. "The Empire State Building."

And then he changes the subject. ■

Real Estate

Mervyn Rothstein

A new information technology center in lower Manhattan has so far leased a third of its space.

WHEN the Rudin Management Company announced early last summer that it was spending \$15 million to renovate a vacant office building at 55 Broad Street and turn it into the New York Information Technology Center, some real estate people were skeptical that enough tenants could be found to fill the building's 400,000 square feet.

Now, a little more than six months later, 11 leases have been signed for a total of 39,134 square feet, and 17 leases, totaling 68,052 square feet, are out awaiting signing. One 24,000-square-foot floor will contain a Nynex lab, video teleconferencing equipment and long-distance learning systems to be used by several universities — among them Columbia and New York University.

Add it all up and the total space accounted for comes to 131,186 square feet, or just under one-third of the building.

"That's a deal per week," said William C. Rudin, the company's president. "It shows that there's a market downtown — that the skepticism was unfounded."

The 30-year-old building, at Beaver Street south of the New York Stock Exchange, had been the headquarters of Drexel Burnham Lambert and had been vacant for more

than five years, since the investment banking concern went bankrupt. The moribund downtown real estate market had diminished hope that the building would come to life again. But the Rudin Company decided to install telecommunications equipment, fiber optic wiring and satellite uplinks in the hope of attracting some of the many new companies being created to plug into the computer and information explosion of the 90's.

The 11 leases signed range from 908 square feet — for Intercom On-line Inc. — to 13,319 square feet — for N2K Inc., a company that specializes in music, technology, multimedia and on-line services. The tenants also include the New York New Media Association, an organization of multimedia professionals, which is moving from 515 Madison Avenue to 1,659 square feet at 55 Broad. Annual commercial rents are in the mid-to-upper teens a square foot plus taxes and cleaning costs. The rents are considerably below midtown prices but in keeping with those in the high-vacancy downtown area.

Mr. Rudin credited Mayor Rudolph W. Giuliani's Downtown Revitalization Plan — which provides tax abatements to spur development — for contributing to the leasing success so far. The building is eligible

for the abatement so tenants will save thousands of dollars in taxes.

Mr. Rudin said that he expected the building to be fully leased by the end of summer.

In another downtown deal, Joseph Moinian, a developer who specializes in renovating properties, has purchased the office building at 90 John Street for \$6.5 million.

Ron Cohen, a managing director at the Edward S. Gordon real estate company, said Mr. Moinian might convert the building's narrower sunny upper floors to residential use and keep the lower floors commercial.

Mr. Cohen, who brokered the deal, said that the 400,000-square-foot "class B-minus" office building between Gold and Pearl Streets had been troubled in recent years and had many physical problems, including difficulties with the facade. He said that renovations had already begun on the building, which is 32 percent occupied.

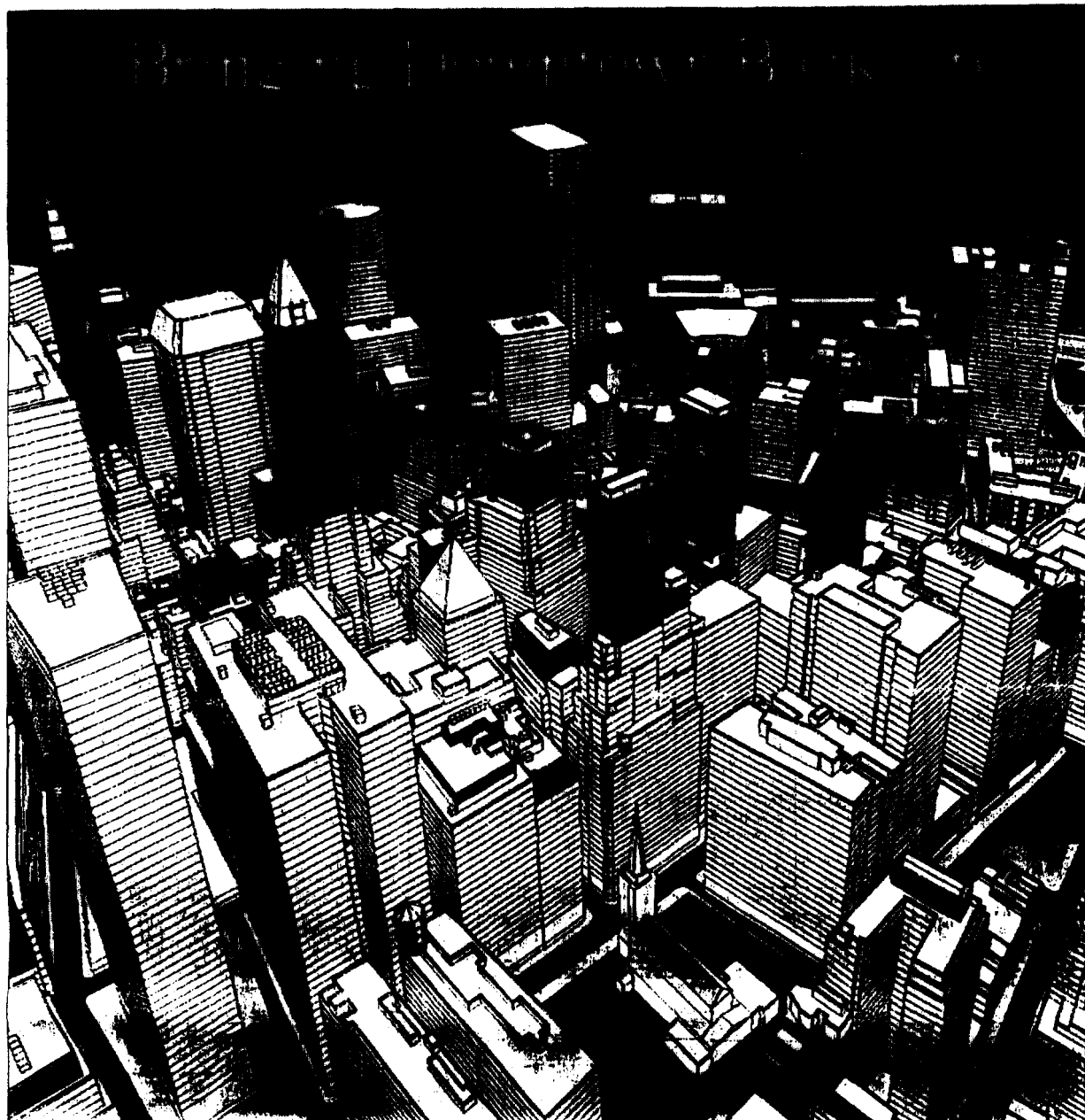
F.B.I.'s Queens Office

The Federal Bureau of Investigation has leased 48,710 rentable square feet at Crossroads Tower in Kew Gardens, Queens, for its Queens

offices. The lease, for 20 years at an aggregate rent of \$28 million, was negotiated for the bureau by the Federal General Services Administration. The bureau is to move in late spring from 95-25 Queens Boulevard in Rego Park.

The 500,000-square-foot Crossroads Tower, at the intersection of the Interboro Parkway, Union Turnpike, Queens Boulevard and Kew Gardens Road, is the largest office building in Queens. Built in 1989, it languished in the real estate recession of the early 90's and fell into bankruptcy. When Newmark & Company Real Estate Inc. became its managing and leasing agent two and a half years ago, 60 percent of the building's office space was vacant. The office vacancy rate is now 7 percent. Tenants include the New York State Department of Taxation and Finance (41,000 square feet) and the Queens District Attorney's Office (45,000 square feet).

"Newmark has leased more than 200,000 square feet of space since we took over," said Brian S. Waterman, a Newmark senior managing director, who handled the deal with James D. Kuhn, the company's president.



Pete S. Bochetti for the Environmental Simulation Center, New School for Social Research

A computer model of lower Manhattan, as seen from top of World Trade Center's south tower, shows in red the kind of office floors that might be candidates for residential conversion: 8,000 square feet or less, more than 15 stories above the street. Towers with many such floors include 70 Pine Street (1), 40 Wall Street (2), 20 Exchange Place (3), 1 Wall Street (4) and 30 Broad Street (5). Trinity Church is in the foreground.

A revival plan would turn office towers into residences.

By DAVID W. DUNLAP

FOR the last 40 years, whenever lower Manhattan needed a shot in the arm, it came in the form of enormous new projects, each larger than the one before: Chase Manhattan Plaza in the 1950's, the World Trade Center in the 70's, Battery Park City in the 80's.

The approach in the 90's may be radically different.

one that seeks to exploit the buildings that are already there. The administration of Mayor Rudolph W. Giuliani has been moving on a number of fronts to encourage residential and commercial reuse: tax breaks, zoning changes and landmark designations.

Although construction began last month on the New York Mercantile Exchange at Battery Park City, no one expects many more groundbreakings downtown in the near future. A truer sign of the times is the Rudin family's effort to resuscitate 55 Broad Street, an empty 28-year-old tower, as the New York Information Technology Center.

Whether visionary or delusional, the possibility is also being explored of converting some distinguished but obsolete office towers into apartment buildings; cliff dwellings and aeries that would appeal to the same pioneering spirit that colonized SoHo and TriBeCa.

Which buildings? Probably those with smaller floors, which have proportionally more windows and exposures, meaning that daylight can reach more of the interior. Elevation is another factor. Even the hardest trail-blazer is not likely to move downtown simply to live near the bottom of a dark canyon.

Taking these attributes as a guide, the Environmental Simulation Center of the New School for Social Research pinpointed on its computer model of lower Manhattan every floor 180 feet or more above sea level (typically, about 15 stories above the street), with 8,000 square feet of space or less. The results are shown above in red.

One building that stands out in this view is 40 Wall Street, on which Donald J. Trump holds a purchase option.

Continued on Page 8

Finding Different Ways to Bring Downtown Back Up

Continued From Page 1

with the view of turning it into a mixed-use building. But Mr. Trump and other prospective players downtown have been waiting for the State Legislature to act on a package of tax benefits proposed by the Giuliani administration to encourage residential conversion and commercial renovation. The bill was passed in the Assembly June 28 but was not approved by the Senate until Thursday afternoon, by a vote of 53 to 1. Senator Franz S. Leichter, Democrat of Manhattan, cast the only no vote.

"There are developers waiting in the wings for passage of the legislation," said Deputy Mayor Fran Reiter, who heads the Lower Manhattan Task Force, together with Deputy Mayor John S. Dyson. "When you look at what the Rudins have already committed to at 55 Broad Street, that's exactly the kind of investment we wanted. I think we're going to quickly see some older buildings take advantage of the benefits to do residential conversions."

The incentive package accompanies a series of zoning changes that the City Planning Commission approved Tuesday, Sept. 19, a day that may prove to have been particularly fateful for lower Manhattan. Also that day, the Landmarks Preservation Commission made the first of a new round of designations downtown and ground — or at least landfill — was broken for the New York Mercantile Exchange.

The exchange building, at Battery Park City, will be 15 stories high, with two 25,000-square-foot trading floors. The structure, designed by Skidmore, Owings & Merrill, is to be completed in 1997 as part of the World Financial Center. The Mercantile Exchange merged with the Commodity Exchange last year and is now composed of two divisions, known as Nymex and Comex. Officials estimated that the project would keep more than 8,000 jobs in New York.

The retention of an additional 5,000 or so jobs seemed all but guaranteed Thursday when the Coffee, Sugar and Cocoa Exchange said it would remain in lower Manhattan rather than move to Jersey City, after New York officials offered a \$91 million incentive package. The New York Cotton Exchange is to vote Tuesday on whether to reconsider its planned move in light of the decision by the Coffee exchange.

Even as they play high-stakes retention games with New Jersey, city officials acknowledge that downtown will need to do more to survive than simply hold on to its reputation as a financial service center. They say it will have to grow into what planners are fond of calling a "24-hour" community: with residents, restaurants, stores, maybe even a movie theater.

"The traditional character of the area isn't what business wants today," said Joseph B. Rose, chairman of the City Planning Commission. "The good thing is that you have an immense amount to build on."

TO encourage residential conversion, a 14-year abatement is being offered on property taxes for office buildings that are turned into apartment buildings, beginning the year that a temporary certificate of occupancy is issued for the new use. The abatement is 100 percent for 10 years and then declines by increments of 20 percent over the remaining years.

In addition, a 12-year exemption is being offered from the increase in taxes that an owner would owe due to the higher assessed value of the building. The exemption would be 100 percent in the first eight years and then decline by increments of 20 percent over the following four years.

The zoning changes would relax restrictions on joint living and working spaces, make it easier to convert the very high density office towers that were built before the 1961 Zoning Resolution and allow parking to be provided in converted buildings.

"We've taken away all the regulatory impediments to adaptive reuse of these

buildings," Mr. Rose said. "There's a market moment and we're very intent on not letting that moment go by."

"It's a very aggressive program," said Carl Welsbrod, president of the Alliance for Downtown New York, which manages the Lower Manhattan Business Improvement District. "The city estimates that it would produce 200 or 300 units a year. My guess is that it would be higher. People are waiting for the starting gun. Even 1,000 units will significantly change the look and feel of downtown."

"Downtown has fabulous space, spectacular views and universal access to the waterfront," he said. "It will provide a place where middle-class and upper middle-class people can live and walk to work."

But State Senator Leichter, who has questioned governmental incentives over the years, took a skeptical view of the Giuliani plan. "Government is not justified in spending money to support the creation of what is essentially luxury housing," he said.

"What economic justification is there in supporting Donald Trump's conversion of 40 Wall Street?" Mr. Leichter asked. "Is that

State Senate has approved Giuliani tax-benefit package.

going to bring back Wall Street and create a lot of jobs in lower Manhattan? I wonder whether we're like King Canute, telling the tide not to come in."

The downtown residential market commands rents of roughly \$25 to \$30 a square foot annually, or \$2,100 to \$2,500 monthly for a 1,000-square-foot unit. These rents are about 10 to 20 percent less than in TriBeCa and SoHo. "Without the benefits, you couldn't renovate these buildings and make them come into what the market will bear," said Ann Welsbrod, vice president for economic development at the Alliance (and no relation to Carl Welsbrod).

Residential conversion is not the only goal. To encourage commercial renovation of older buildings, a five-year abatement of existing property taxes and commercial rent taxes will be granted on space that is either newly leased or re-leased. These savings, which would be retroactive to April 1, are to be passed on to tenants. They would apply to buildings constructed before 1975.

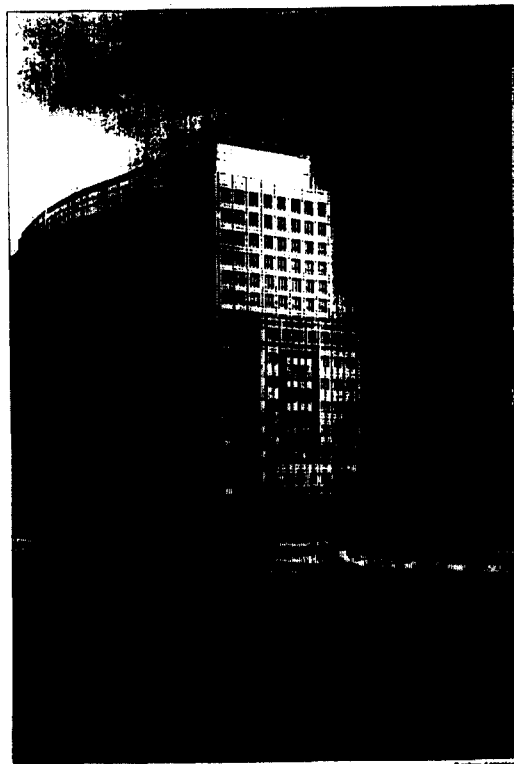
The programs could reduce commercial occupancy costs in lower Manhattan by an average of roughly \$3 a square foot a year, bringing it down to around \$25 a square foot, which is competitive with new space in northern New Jersey, said Connie Fishman, director of planning and development for Deputy Mayor Reiter.

Property taxes would be cut by 50 percent for the first three years of the abatement, but the abatement cannot exceed \$250 a square foot. The abatement would decline by one-third in the fourth year and two-thirds in the fifth year. There would be a 100 percent exemption from commercial rent taxes in the first three years. The exemption would then decline.

Among the conditions are that large tenants — more than 50 employees — must sign leases running at least 10 years. Smaller tenants must sign leases running at least 5 years. Tenants that are relocating must either come from Manhattan, south of 90th Street, or from outside New York City.

If a tenant is renewing, the landlord must invest at least \$10 a square foot in improving tenant space or common areas. For newly leased space, the landlord must invest at least \$35 a square foot.

In this category is the New York Information Technology Center, a 31-story office tower at the corner of Beaver Street with 400,000 square feet of empty space. The structure is being renovated for informa-



Rendering of the New York Mercantile Exchange Building, left, to be completed in 1997 as part of the World Financial Center.

tion and telecommunications companies, offering data transmission capabilities and rents beginning around \$15 a square foot. It is to open next month.

"We're going to be the first project on line and taking advantage of the Mayor's plan almost immediately," said William C. Rudin, president of Rudin Management, which took a calculated gamble and began the renovation before the Legislature acted.

MR. RUDIN said four tenants had been signed for 25,000 square feet, with deals pending for another 150,000 square feet. "The leasing activity has gone beyond our expectations," he said. "We're looking at our building as a prototype," Mr. Rudin said. "We're hoping this spreads beyond our building and becomes a district. You're going to have the energy of these young software entrepreneurs working around the clock."

Two blocks away is 40 Wall Street, the leasehold of which Mr. Trump intends to purchase. One possibility is a \$100 million renovation of the 46-story skyscraper, built in 1929 as the Bank of the Manhattan Company headquarters, into a mixed-use building, with 160 apartments in the tower portion. The building is topped by a pyramidal copper peak that has long been one of the unofficial landmarks of downtown.

Mr. Trump started preservation late Sept. 19 when he appeared personally before the landmarks commission to speak condition-

ally in favor of the official designation of 40 Wall Street. Those whose memories went back to 1980 could recall workers raising the Bonwit Teller Building on Fifth Avenue to make way for Trump Tower.

"He came down to support preservation," said Jennifer Raab, chairwoman of the landmarks commission. "People's jaws were really dropping."

For his part, Mr. Trump said: "I have a lot of respect for the current commission. Jennifer Raab's philosophy meshes with what I think, so I went down and made a lot of people very happy."

"Forty Wall Street is a great building," Mr. Trump said, "but I don't want to be inhibited from bringing it back to greatness again." For instance, he would not want to be stopped from gilding the copper top of the building. "That's an important element from a marketing standpoint," he said.

The Wall Street tower is one of about 20 buildings and a historic district in lower Manhattan that are on the landmarks agenda. The commission has already designated four structures around Bowling Green:

41 Broadway, which was remodeled in 1921 to serve as headquarters for J. P. Morgan's steamship combine, the International Mercantile Marine Company. On the facade are mosaic coats of arms representing the company's chief ports of call.

411 Broadway, completed in 1888 as the Bowling Green Offices. The facade is rich with Greek architectural elements.

425 Broadway, completed in 1921 as the Cunard Building. Cunard's former steamship ticket office, now a post office, has an octagonal rotunda under a 65-foot-high dome that is covered in rich and colorful murals. One of the least known and most ornate public rooms in lower Manhattan, the great hall received a separate interior landmark designation.

426 Broadway, completed in 1928 as the headquarters of the Standard Oil Company. A colossal oil lamp atop the building's spire still attests to its origins.

OTHER early office towers currently under consideration are the former American Express Building (65 Broadway), the Empire Building (71 Broadway), the former American Surety Building (100 Broadway) and the former Equitable Building (120 Broadway), which was so frighteningly massive that it helped spur the first Zoning Resolution in 1916. The commission is also weighing the creation of a Stone Street Historic District, taking in 15 small buildings on two blocks south of Hanover Square, including India House, a 142-year-old individual landmark that was once home to the Cotton Exchange.

As part of the process, an economic development plan is being prepared by the Praxid Group, a real estate consulting firm, suggesting some of the uses for the buildings. And an architectural master plan has been drawn up by the firm of Beyer Blinder Belle, including streetscape and facade improvements. "It's a pre-approved plan, so you can be in and out in a week or so," Ms. Raab said.

"My goal is to have the regulatory plan approved at the same time, or very close to the same time, as the district itself," she said. "I'm trying to explain to owners that I really want to be their advocate down here. I want to help this area become revitalized."

One of the more daunting hurdles to residential revitalization is the lack of open space. A new urban design plan by Peterson Littenberg Architects, sponsored by the Battery Park City Authority and J. M. Kaplan Fund, calls for the creation of several small parks throughout lower Manhattan.

Residential buildings tend to cluster around each other, said Jon McMillan, director of planning for the authority. "If, indeed, there is so much undervalued real estate in lower Manhattan and more office space than anyone could need," he said, "why not acquire office buildings, tear them down and put in place a park? You could vastly improve the value of real estate around that park."

The computer model at the New School could be used to search for the potential locations of such parks, based on where the likeliest residential redevelopment might occur. "It allows you to poke at reality by combining visual and non-visual information," said Michael Kwitler, director of the Environmental Simulation Center.

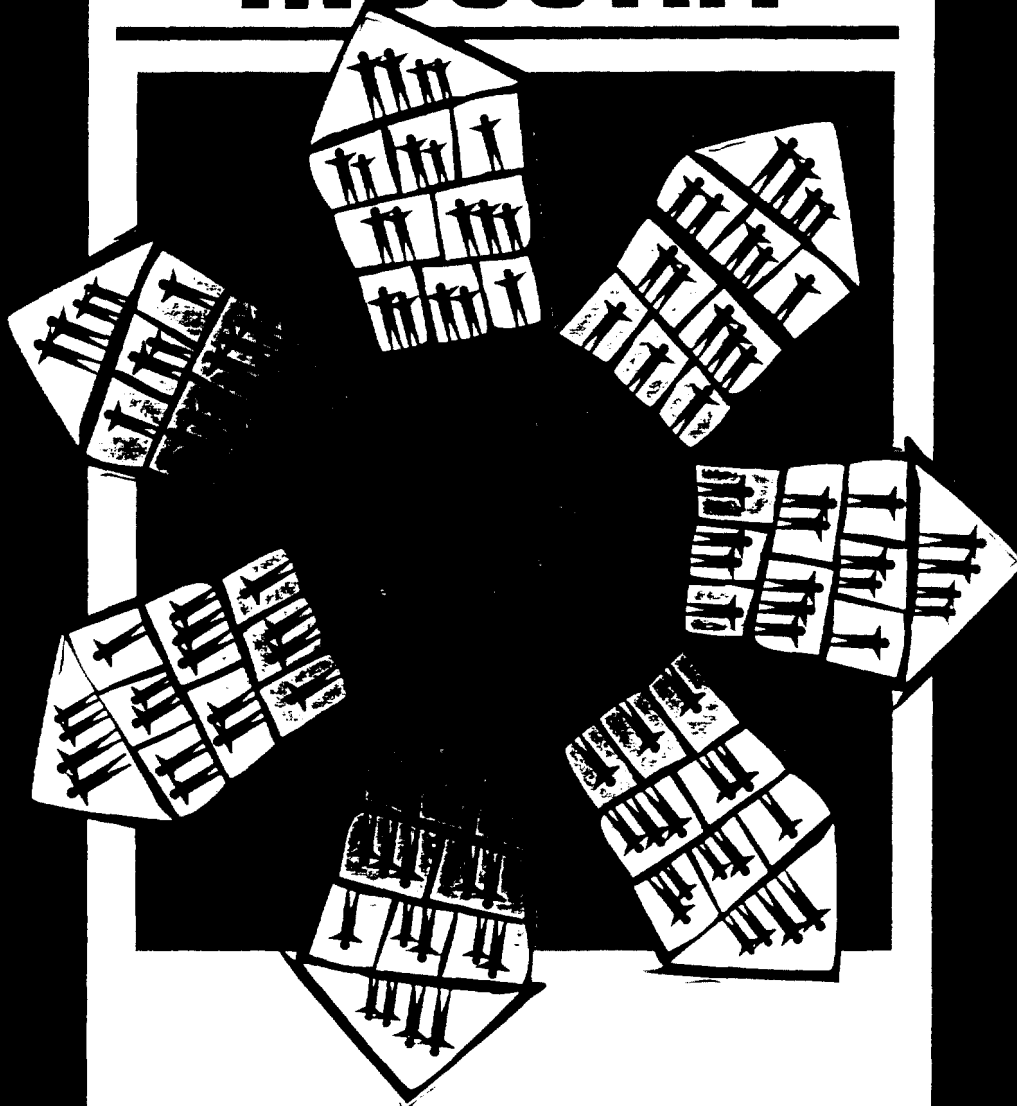
The model can highlight dozens of attributes besides floor area and elevation — use, age, landmark status, number of elevators, floor-to-floor height, floor area and the extent to which it exceeds or falls short of current zoning. Soon, with the addition of data on 267 buildings from Cushman & Wakefield, the model will be able to pinpoint vacancy rates as well.

The completion of the model was underwritten by the Kaplan Fund. The co-chairman of the fund, Richard D. Kaplan, an architect, has taken on lower Manhattan as a kind of personal crusade.

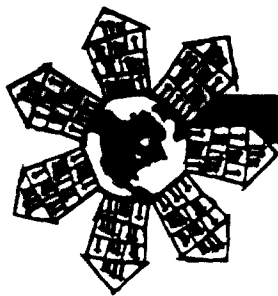
"These species survive that maximize available resources, I'm reminded by Darwin," he said. "The available resources of downtown is an incredible base of fantastic buildings. Now is an opportune time, as rents and prices drop, for a new kind of city to grow up out of this old one."

"Can we turn the great dowager queen of American cities into a charming princess at the ball?" Mr. Kaplan asked. "It's the first time anyone has thought of this question in an area so dense and so full of history." ■

THE FUTURE OF THE APARTMENT INDUSTRY



BY COATES & JARRATT, INC.
For The
National Multi Housing Council
& National Apartment Association



THEME SIX

INFORMATION TECHNOLOGY: THE TRANSFORMING TECHNOLOGY

New information technology tools will improve existing practices and lead to new ways of doing things. The box below illustrates the breadth of technologies important out to 2010 and beyond.

Key Information Technologies to 2010

Computing

CAD/CAM
CD-ROM
Computer conferencing
Databases
Desktop publishing
Digitization
E-mail
Electronic publishing
Expert systems
Flat Screens
Fuzzy logic
Hypertext
Knowbots
Language translation
Mechatronics
Modeling
Neural networks
Robotics
Smart cards
Software
Speech recognition
Voice synthesis
Voicemail

Telecommunications

Cellular phones
EDI (electronic data interchange)
EPOS (electronic point of sale)
Fax
Fiber Optics
Modems
Networks: LANs, MANs WANS
Pagers
PBX (private branch exchange)
PDAs (personal digital assistants)
Personal communicators
Global positioning satellites
Telephones
Videoconferencing
Videotext/video-on demand
Near Video-on-demand

Imaging

GIS (geographic information systems)
Holography
Modeling
Multimedia
Photography
Simulation
Virtual reality

Source: Coates & Jarratt, Inc.

This theme examines the information technology as a fundamental transforming force in society, the home, and the workplace.

The trends analyzed in this theme are:

- Trend 6.1: Information technology continues to deliver innovative capabilities**
- Trend 6.2: An information infrastructure is evolving, but at an erratic pace**
- Trend 6.3: Telecommunications networks are switching from electronic to photonic**
- Trend 6.4: Images are pervading daily communications**
- Trend 6.5: Information technology expands in home use**
- Trend 6.6: Technology allows wider participation in design**
- Trend 6.7: Information technology is improving building management and leading to smart buildings**

Why this theme matters to the apartment industry

Information technology has four big implications for the apartment industry. It will: change the way business is done, expand the activities and expectations of residents, promote working at home, and reshape design and building management. More broadly, information technology affects design, financing, construction, management, amenities, and use of space. New applications of information technology may be a key to giving one apartment community the competitive edge over another in marketing.

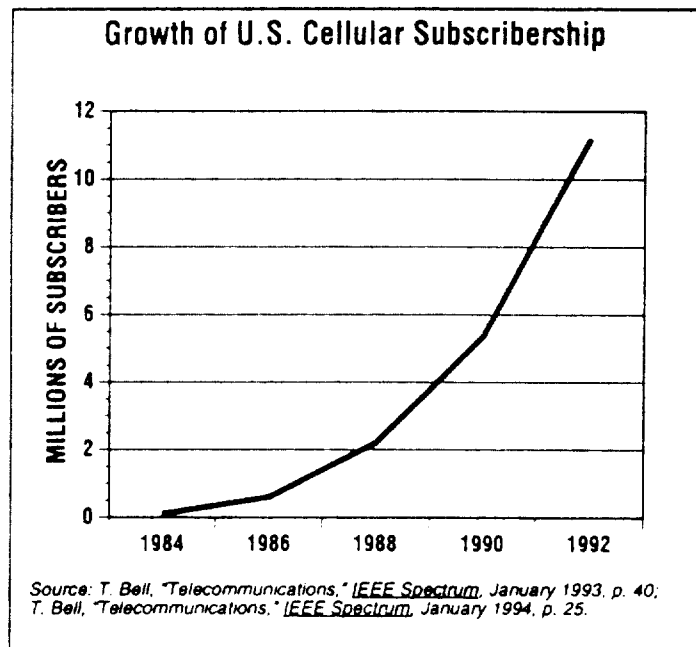
Trend 6.1: Information technology continues to deliver innovative capabilities

Almost monthly, computer technology achieves new thresholds of capability. The exponential growth in computing power will continue out to 2020 as current chip technology approaches physical limits. The home user will continue to find after owning a PC for a year that there are more powerful ones available at no higher cost. Meanwhile, the U.S. already had at least 20 million networked PCs in 1991, and Market Intelligence Research Corp. projects 100 million networked by 2000.¹

Computing and telecommunications are merging particularly with the spread of computer networks over the phone lines. Up to now, it has been the microprocessor that has driven computing and the information technology revolution. While that will remain important, the next generation's key technology will be the communications laser. Lasers read compact disks, carry long distance calls over fiber optics, and are central to printers, plain-paper faxes, and copiers.²

Information technology is blossoming into a profusion of choices, means of access, and capabilities. This trend sketches out many of the elements of information technology that are part of the revolution.

Speech recognition and voice synthesis — Computer speech recognition is developing quickly. Voice synthesis is already well-developed. Computers now understand thousand-word vocabularies. The technical transition from keyboard to voice interface will take place over the next decade. Speech recognition will then spread to other devices, such as appliances.



Portable and wireless — Go-anywhere communications will become a reality in the 2000s. People will be in touch no matter where they go, at one telephone number. There will be a proliferation of portable, wireless devices to enable person-to-person, person-to-machine, and even machine-to-machine communications. Global positioning satellites (GPS) will add accurate location identification to the mix. GPS will enable, for example, direction finding for drivers. Avis Rental Car Co. is already testing GPS equipment in its fleet.

Videoconferencing — A live conference or meeting, using video cameras and microphones to allow two-way voice and image communication for several people at each end. Videoconferencing today usually relies on slow scan video to save on costs in transmission. The technology is currently expanding to the desktop. Videoconferencing's more general use in work and homelife and its impacts on families and households have yet to be discovered.

Expert systems — Knowledge of a human expert is incorporated into software. Where expertise is rare, such systems keep alive unique knowledge that would disappear when an expert dies or retires. In areas where skilled labor is short, expert systems can be used to automate or simplify tasks so that less-skilled workers can do them.

Fuzzy logic — Microprocessors enable devices to make decisions based on uncertain data. With fuzzy logic, devices can learn by experience. Cars already use fuzzy logic to learn the driving habits of their owners and adjust automatic transmission shift patterns for quicker response time and better gas mileage. Fuzzy logic will lead to more user-friendly computers, appliances, expert system assistants, knowbots, automobiles, home energy management systems, etc.

Artificial intelligence (AI) — Hardware and software that mimic functions especially well-developed in people. AI will distribute intelligence throughout organizations and society. It will be embedded in computing and communications tools, making these tools valuable assistants for people.

Mechatronics — The capability to sense either the internal or external environment and make appropriate responses. Devices and systems with embedded microprocessors are connected to a central control mechanism or database. Mechatronics enables remote monitoring, feedback, and self-correction. In manufacturing, for example, dark, lights-out factories operate by computer-integrated mechatronic systems of smart machines and robots without human intervention.

Implications for the apartment industry

- ◆ Expert systems, artificial intelligence, and wireless communications multiply the abilities and time of workers. These technologies should enable apartment management to downsize and consolidate certain functions. For example, there is no need for someone on site to manage HVAC systems. They can be managed electronically from anywhere.
- ◆ Expert systems can take the place of the expert who must be on call around the clock. They can make the knowledge and judgment of an expert — a master mechanic, for example — available everywhere, around the clock.
- ◆ With mechatronics, every part of a structure can be made smart, that is, able to evaluate its internal operation and how well it is doing its job. This could yield great gains in efficiency for building management, especially in energy conservation and indoor climate management.
- ◆ The industry can embrace the potential of information technology on two fronts: for the business to improve its operations, and for residents' use in apartment units.
- ◆ Database availability helps everyone find and analyze information. That includes potential renters looking for an apartment and regulators looking for infractions.
- ◆ Expectations will be the bane of anyone using information technology for interactions with customers or as a service to a customer. Apartment managers will find residents expect the latest available technology, including cable TV, pay-per-view, and up-to-date telephone hookups. As fiber optics come into prominence, residents will expect fiber connections, and laggard apartments may be punished by losing residents.
- ◆ The power and capability of databases should allow the industry to get even better at tracking residents and units, marketing to critical niches, monitoring the performance of HVAC systems, comparing costs from building to building, etc.
- ◆ Information technology allows instant detection and alerts to management of problems. Management will be expected to be nearly as prompt in its response to problems.
- ◆ Remote diagnosis and repair of problems is increasingly possible, either through automation or through expert systems assistance for on-site repair and maintenance people.

The Role for Information Technology Throughout the Lifecycle of a Resident

<u>Stage in cycle</u>	<u>Information technology applications and effects</u>
Apartment hunting	Renter identifies possible communities through interactive dial up system. Video tours of neighborhoods, apartment communities.
Showing units/tours	PC-based simulated walk throughs of units. Tours of premises, inside look at currently occupied units. Simulation of what units would look like redecorated, or with prospective renter's belongings in them.
Signing a lease	Terms and documents by fax or dial-up. Deposit money sent electronically.
Move in	Scheduling and logistics of moving with expert system advice.
Decoration and customization	Simulation of redecoration choices and options.
Paying rent	Direct withdrawal. Resident's queries answered electronically from headquarters. Electronic reminders.
Coming and going	Identification systems such as voice recognition for security. Video-intercom systems between units and premises entryways.
Communications with management	E-mail throughout the residential community for announcements, etc. Videoconferencing from resident's PCs with remote management staff, repair people. Emergency sensing and alert systems direct to maintenance staff or repair services.
Living/working/-learning in the home	Interactive, multimedia systems as an adjunct to most activities from cooking to education. Fully-equipped home work study centers and additional office capabilities in on-premises centers. Full access to educational and entertainment media through cable, satellite, etc.
Upkeep/repairs	Reminders and how-to advice for residents delivered by interactive CD, videocassettes, or interactive PC. Scheduling and regular updates done automatically so that resident may check on work while away.
Move out	Scheduling optimal time. Reimbursement of security deposits done electronically to save paperwork.

Trend 6.2: An information infrastructure is evolving, but at an erratic pace

The information superhighway is the media term in the U.S. for an information technology infrastructure. As the interstate highway system was the backbone of goods transportation central to industrial society, so the information infrastructure will be the backbone of the information society. This infrastructure will consist primarily of fiber optics supplemented by coaxial, copper wire, and wireless technologies such as cellular, satellite, and microwave. Today, instead of an information superhighway, we have an information railway of differently gauged tracks.

The information infrastructure is not a new idea, but the willingness of telecommunications and cable television companies to make the large investments required is. Cable and telecommunications executives have pledged to spend \$125 billion to build the infrastructure, if they are given freer access — i.e., government lifting antitrust restrictions on providing information services — to provide information services.³ They may also seek access to apartment units to cable them. Another estimate for constructing a ubiquitous broadband network to reach every home and business, however remote, is between \$200 and \$600 billion, or about \$2,100 to \$6,200 per U.S. household.⁴

A national network, as precursor to global networks, means people can talk anytime to colleagues, customers, and experts, and find information sources anywhere. Today's global telephone network, a hybrid of copper wires, optical fiber, and satellite transmission, is the de facto global network. It needs additional capacity to become the network of information superhighways that people envision.

The global network will have people communicating with people and machines talking to machines as in financial trading, automatic alarms to emergency services, and environmental sensing and reporting. The non-human uses will proliferate and become predominant in the system.

Construction of the infrastructure will not be uniform. Certain state and local areas will be pioneers. Although large metropolitan areas will have the physical infrastructure in place first, innovative applications may come from a wide range of communities. The first manifestations may be local communities with their government offices, schools, and businesses wired up.

For the housing market, the goal will have to be to keep up with standards, and especially consumer expectations for information resources, connections, and devices. People will expect to be able to reach anyone or any information, anytime, from anywhere.

The Benefits of the Information Infrastructure

The information infrastructure
is being touted as a boon:

- ◆ to householders in bringing them information, time savings, new safety and security
- ◆ to business by improving productivity and international competitiveness
- ◆ to education by enabling distance learning, digital libraries, and other educational programming
- ◆ to medicine in linking remote areas to high tech centers
- ◆ to politics by encouraging electronic town hall meeting
- ◆ to criminal justice by video court arraignments and/or witnesses
- ◆ to entertainment by video on demand

Implications for the apartment industry

- ◆ Prospective residents may soon expect to be offered Internet access with their apartment units. That may imply that large apartment communities have their own nodes on the Internet, and special telephone trunks for high volumes of data transmission.
- ◆ Alliances with information technology companies may reveal ways to offer residents more telecommunications options at acceptable costs.
- ◆ Apartment managers would benefit from a corporate information technology strategic plan.

Trend 6.3: Telecommunications networks are switching from electronic to photonic

Fiber optic cables boost the bandwidth, or information carrying capacity, compared to copper wires. A single fiber pair has the capacity to carry 25,000 telephone conversations or 1,000 video channels.⁵ There is little question that fiber will replace copper — the only question is timing — because fiber now costs less than copper. Ultimately, whenever lines are updated, they will be fiber. Pacific Telesis, for example, plans to replace almost half the copper phone lines of California's 10.4 million households for \$16 billion over seven years. U S West and Bell Atlantic have announced similar plans.⁶ Meanwhile, over the next 10 to 15 years, data compression will enable creative use of existing copper. Many analysts speculate about distributing intelligence in the computing and telecommunication devices rather than in central switching stations as it is today.

Currently, electronic processing and transmission of information slows down systems. An all-photonic network will be faster and more reliable. The challenge, however, is converting computing from electronic to photonic as well.

Satellite networks will reach wherever it is not cost effective for fiber to go. They will provide links for wireless services, such as personal communicators. Often, they will compete directly with fiber optic links.

The information infrastructure may bypass less affluent or non-metropolitan areas. Universal access is not guaranteed if the information infrastructure is built totally with private dollars.

Implications for the apartment industry

- ◆ New buildings should be "fiber ready", that is, physically prepared for fiber optics or cabling, or both. Internal fiber optics to each unit will probably be a competitive necessity within a decade.
- ◆ Fiber optics will fundamentally change the quality and capacity of telecommunications lines. That change will step up innovations in how people use the network, including those of home users. Future uses may include virtual interaction with friends and educators, and videoconferencing.

Trend 6.4: Images are pervading daily communications

Images are complementing and replacing words in business communications. They pack a great deal of information into a quickly scannable and usable form. For instance, at the 1994 Winter Olympics in Norway, icons for each sport were used to transcend language barriers for participants, audiences, and television viewers. Information technology is expanding the power of images locally, nationally, and globally.

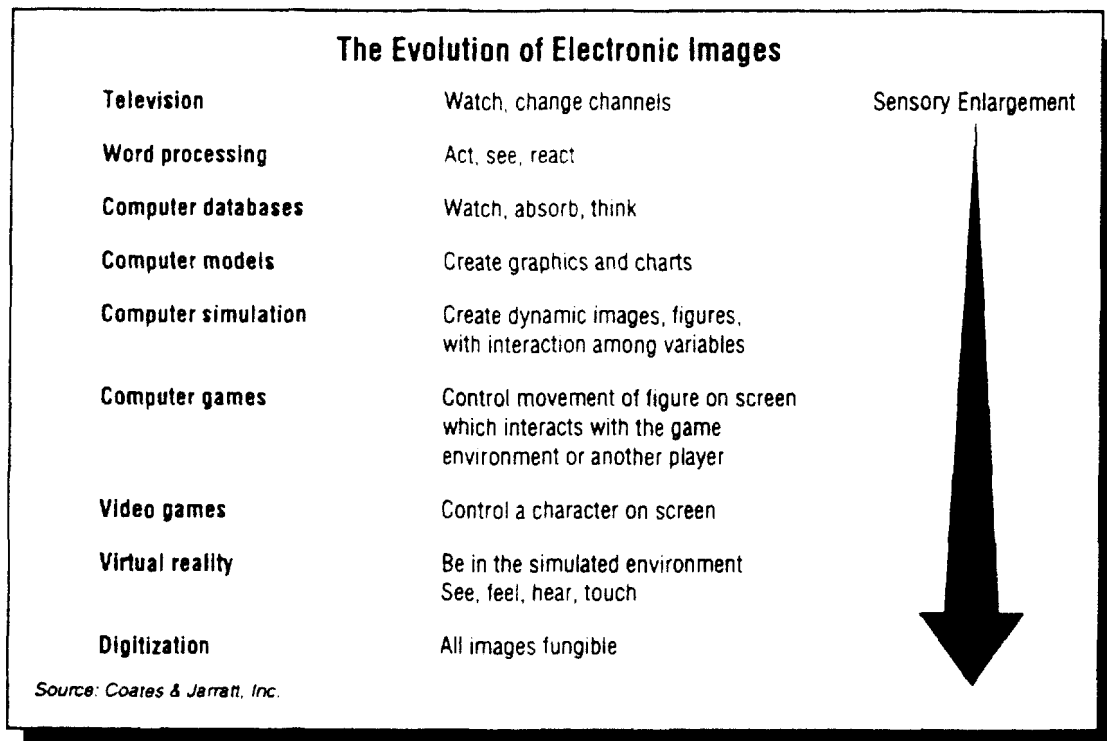
Images — pictures, video, computer-enhanced and created graphics and animation — are increasingly pervading day-to-day communications. Images make information easier to grasp for most people. Our sensory enlargement is evolving primarily through images.

More and more businesses will face the demand, “show me, don’t tell me,” from customers, workers, and partners.

People will work with images as easily as data and text, creating a seamless environment of easily accessible information.

Currently, images are a bottleneck in computing and communications. The information infrastructure will have sufficient bandwidth to carry images. Corporate documents, sales material, and meetings will become interactive, image-rich, and multimedia over the next two decades. The proliferation of flat screens, which may not take place for 15 to 20 years, will further boost imaging. Matsushita Electrical Industrial Co. of Japan has already introduced the first commercial flat-panel TV screen in Japan.

Image manipulation also makes the simulation of problems possible for experimentation and training. But they require large initial investments of time and resources to develop effective uses of the technology.



Multimedia

Multimedia, in which computers support audio and video in addition to text, brings the computer medium alive. Sound and video clips will annotate text documents, adding emphasis where needed. As multimedia communications technologies become standard business tools in the next decade the user's intimacy with computing will grow. The more senses engaged, the more the user is actively engaged.

The emerging wave is the growth in multimedia-ready computers. Their sale rose from a few thousand high-end devices in 1989 to 3.5 million in 1993 worth \$5 billion. Sales of CD-ROMs rose from a few hundred thousand in 1989 to nearly five million in 1993. Sales of encyclopedias on CD-ROM surpassed book copies in 1993.⁷

Virtual reality

In virtual reality, people experience sensory stimulation through a computer-generated environment as though they were really in it. In experiments today, people are using headgear, gloves, and whole-body suits that read their actions, and feed back sensation. Most virtual reality today still relies primarily on visual rather than auditory, olfactory, or tactile simulation, which will become more prominent as the technology advances.

After 2000, people will enter dangerous places, go inside machinery, visit places around the world, and interact with others in virtual reality environments. Virtual reality will revolutionize training for a wide range of workers. Already, flight simulators and analogous devices train workers for dangerous, complicated, or expensive procedures. Virtual reality will be a boon to training, especially for technicians and those in dangerous jobs.

Consumer electronics

The trend in consumer electronics is toward making the content digital and interactive. Consumer electronics is used here as a catchall category to include everything from electronic entertainment such as video games to interactive television. Set-top boxes on televisions and for information functions will be gradually eliminated. Video games will be part of a computer's software. Television and the computer will meld. In the farther future, screens will proliferate, run entirely by computers.

Imaging technologies will succeed depending on the ability of information networks to handle the large amount of capacity required by images compared to text. High-capacity fiber optic networks or continued advances in data compression technology are required.

Implications for the apartment industry

- ◆ Multimedia offers the possibility of take home electronic tours for apartment shoppers with multimedia PCs. This would constitute an interactive electronic apartment locator guide with substantially more capacity for information than any printed guide, plus color video and sound.
- ◆ Virtual reality should enable training for and actual work in dangerous situations to be done remotely and safely. This could apply to difficult or dangerous work in HVAC maintenance, window washing, and structural repairs.

- ♦ Virtual reality will enable prospective renters to tour apartments no matter where they are using electronic technology. With a visor headset and electronic glove, they will be able to simulate walking through apartments, and eventually, touch surfaces to sense what they would feel like.
- ♦ The pervasiveness of images means more people will expect full color motion images of apartments when they shop, if they cannot visit in person.
- ♦ As the new way to communicate, images will increasingly be used in literature, on-line services, and dials and readouts on appliances. The computer icon and equivalent non-electronic icons, designed to be small but clear in its purpose, will supplant more and more words printed on equipment. Touch screen access to technology will be more and more common.

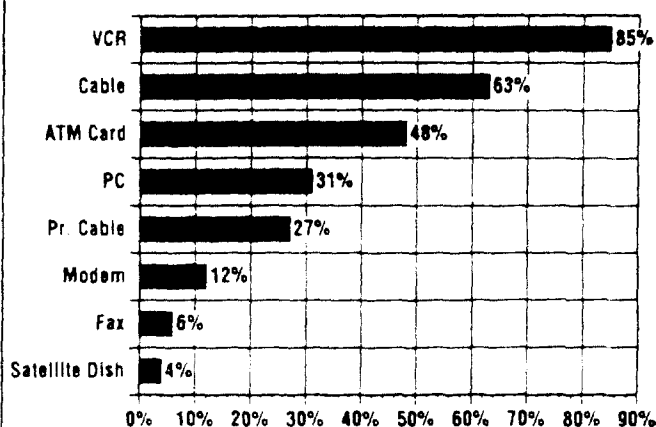
Trend 6.5: Information technology expands in home use

Information technology, having transformed the workplace, is turning its attention on homes. More people use PCs at home. New appliances are made smart with microprocessors, fuzzy logic, and other technologies. The average home is seeing the proliferation of microprocessors in appliances and central systems. Even toys come with on board smarts to interact with children.

A recent social trend is working at home. Twenty-one million Americans worked at home at least one day a week in the winter of 1993, and nearly 4 million Americans run home-based businesses in which they use faxes, PCs, and video conferencing technologies.⁸

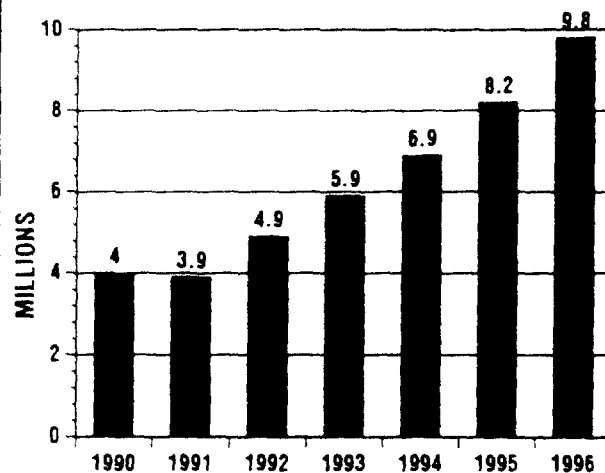
- ♦ About 2 million workers telecommute today, with about 7.5 to 15 million likely to do so by 2000.⁹
- ♦ One in five Americans are self-employed at least part of the time. Half of those own home-based businesses.
- ♦ In 1993, 40% of those who worked at home at least one day a week used a computer at home and 13% used fax machines.¹⁰

Percent of Americans Who Have Certain Information Technology, 1994



Source: Times Mirror Center for the People and the Press, 1994.

Computers Shipped for Home Use Estimate and Projections



Source: Dataquest, Link, USA Today Research, 1994.

More people also go on line at home. The commercial services CompuServe, America Online, and Prodigy, for example, have seen explosive growth in subscribership. So has the non-commercial Internet. For those working at home, the ability to go on line is important. More of those who work at home are on-line users (60%). Nearly half of the on-line users are also communicating with computers at work or school from home.

Children are more and more becoming the focus of home life. As the baby boom generation ages, and enlarge their families, the needs and lifestyle of children are becoming more important. Twenty-eight percent of children use a computer at home for school work, or to play educational games. Among teenagers, 46% have a home computer and 36% use one at least occasionally.¹¹

Perhaps as a result of concerns for time and convenience, information technology is even invading the kitchen. A new device for the kitchen is both a telephone and a fax machine. The NX-1 Home Fax can be hung on the wall, and sells for about \$500.¹²

Television has evolved from a receiver of over-the-air broadcasts to a multi-use function, with cable, VCRs, and video game systems. Ninety-three percent of Americans are using their television sets for more than just broadcast reception.¹³

Implications for the apartment industry

- ◆ As a minimum, the industry should expect to install telecommunications cabling or wiring in more if not all rooms. Whether the cabling should be coaxial wire, twisted pair copper, or fiberoptic or all three is unclear. A hedging strategy is to install conduit through which a variety of lines can be readily snaked.
- ◆ Most homes are ill-designed for information technology and new work patterns. The housing industry, perhaps in alliance with the furniture and electronics industries, could design a Home Work Study Center which would comfortably house one or several family members and the desired electronic equipment to do homework, office work, and other computer-oriented activities.
- ◆ Householders will want their home experience to be closer to their theater experience as expectations rise. Larger TV screens and viewing comforts may change space needs in homes.

Trend 6.6: Technology allows wider participation in design

Architecture is one of the many fields that information technology has nearly completely changed and revitalized. Some architects have begun to explore ways that new technology can break down the isolation from their clients through interactive design sessions at the computer. Architects report dramatic changes in client attitudes toward design while improving the final building.¹⁴ Building costs are lower due to fewer surprises during construction, and since the clients have more influence on its design they have fewer complaints.¹⁵

There is multimedia software available that allows one to create a dynamic 3D view of the entire construction process, starting with a color photograph of the bare site and ending with the computer-rendered building "sitting" on the photo on the monitor. Other benefits of this new practice are a shorter and more creative design phase.

Implications for the apartment industry

- ♦ Interactive design also makes it practical and attractive to directly or indirectly draw would-be residents into the process.
- ♦ Interactive design may be especially valuable in the renovation of buildings.
- ♦ New residents could participate in basic remodeling design such as choosing wall colors, appliances, and alterations.
- ♦ Community residents wherever multifamily developments are planned could participate in and critique designs on screen. This could make them more receptive to new developments.

Trend 6.7: Information technology is improving building management and leading to smart buildings

Computing, telecommunications, and other technologies are powerful tools for apartment managers. For example:¹⁶

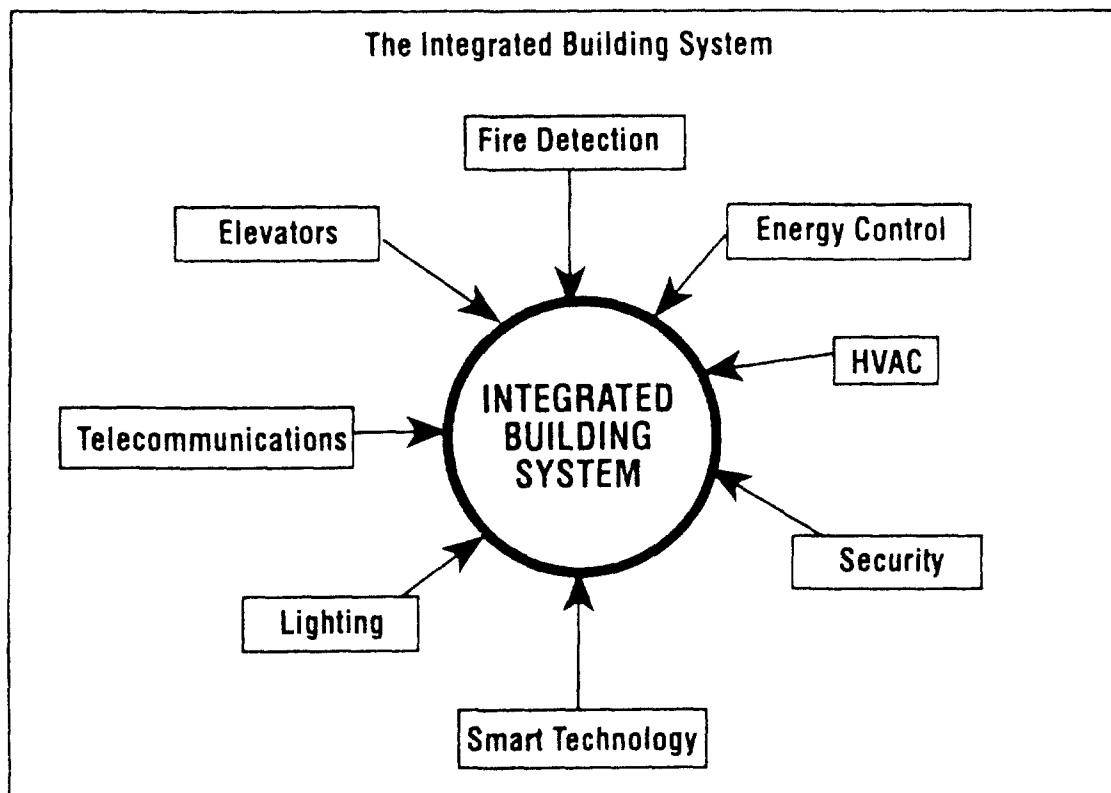
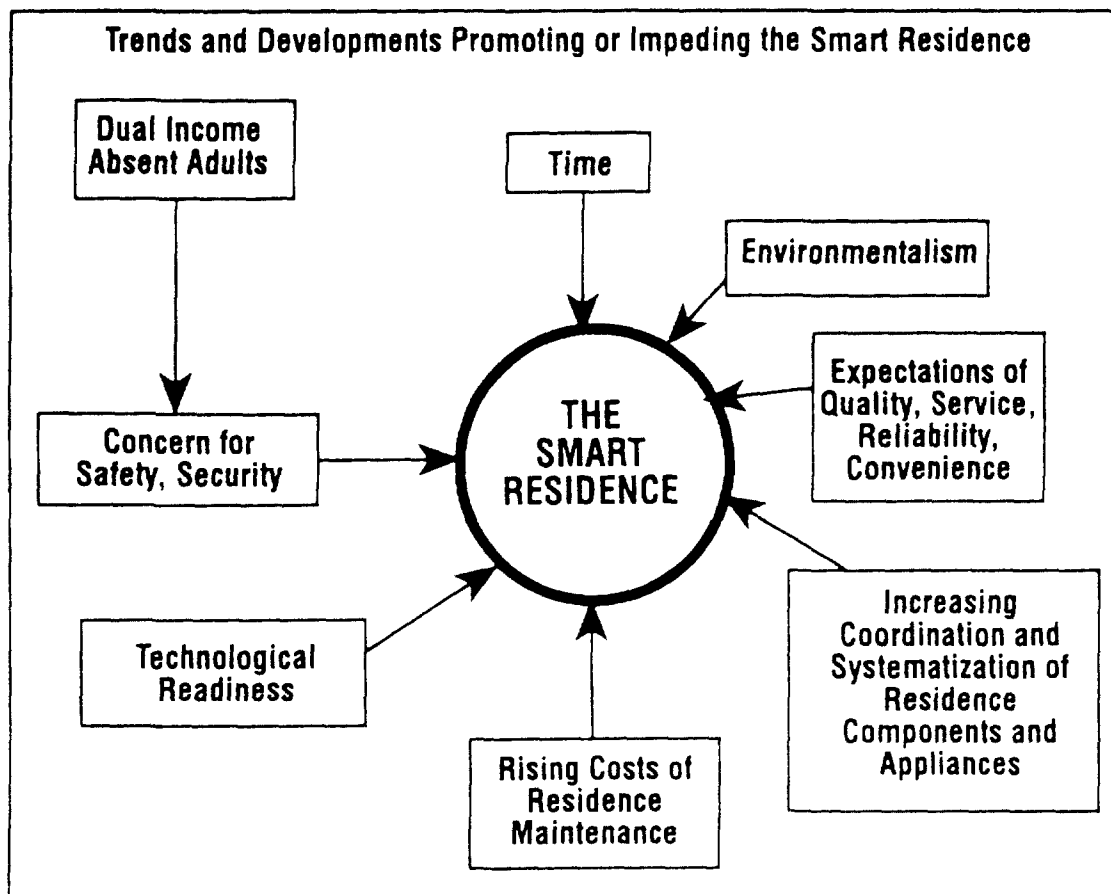
- ♦ Managers can access records of their properties in a few seconds, remotely monitor their systems' performance, evaluate every stage of management, write reports, and communicate cheaply.
- ♦ At the site, managers can use their computers to do rent rolls, demographic market research, resident profiles, market analysis, expense control logs, word processing, inventory control, and work orders.
- ♦ Information technology also serves in advertising and training workers.
- ♦ The industry has ready access to large national databases that track and record apartment prices, rents, and capitalization rates for major markets.

Tom Shuler, executive vice president of Insignia Management Group, says, "Computerization all the way to the site level is not only the wave, but the mandate for the future."¹⁷ He finds that the main reason the industry is in its technological infancy is ignorance of the benefits of information technology.

In addition to aiding management directly, infotech is also offering high-tech services to residents. Most apartments today offer cable television hookups, or they soon will. Any building with cable TV can install a security camera at the front door for residents to see who buzzed.¹⁸ A medical or other emergency alert to a manned front desk is straightforward. Soon, managers will be able to offer multimedia data services to residents, such as video-on-demand, through fiber-optic and ISDN lines — transmission lines with the capacity for interactive, image-rich communications.

Smart buildings

Smart buildings have their security, safety, energy management, entertainment, lighting, and communications systems linked to a central computer that manages them. The best systems enable occupants to control their local environment while providing managers with integrated automation systems to monitor and control rooms, floors, and the entire structure. As smart systems become more efficient and more refined the cost will drop and smart structures, residences, appliances, and devices will become commonplace.



Structures will become smarter as they are designed to react to internal and external conditions to balance the conditions of light, temperature, ambient noise, and air quality, among others. Smart HVAC systems will probably lead the way.

HVAC systems could be controlled automatically through sensors and built-in computers. They could also be programmed and instructed remotely by building managers and residents, as appropriate.

Smart home demonstration projects abound throughout the U.S. They are built by electronics and telecommunications firms, public utilities, and the housing industry, often in alliance with one another. Some of the organizations working on smart homes are Northern Telecom, the National Association of Home Builders, General Electric, and AT&T Bell Labs. Building systems are the hidden elements of construction and design — the electronic, mechanical, and environmental systems that make a building hospitable.¹⁹ As building systems become outdated or inadequate, improvements and new systems and subsystems are becoming available.

Buildings generally have separate systems to regulate heating, ventilation, and air conditioning (HVAC), fire alarms, security devices, etc. Because they are not linked, they are difficult to control efficiently. Integration is slowly transforming wasteful, inefficient and poorly run buildings into highly sophisticated and complex fusions of control systems that save energy and money and improve indoor air quality and safety.²⁰ For example, a security system's motion detectors can detect when a room is not in use and tell the lighting system to turn the lights out. With a glance to a computer screen an operator can tell what is going on in all of the subsystems.

Remote monitoring is gaining widespread acceptance.²¹ This is simply being able to watch over and control a building with integrated subsystems from somewhere outside the building. For example, if a manager wanted to check on energy consumption for a building 20 miles, or 500 miles, away, he could simply access the central computer that monitors the subsystems with his PC and modem.

Important ideas and innovations in modern building operations

- ◆ Better systems attract more residents.
- ◆ Smart technologies revolutionize how buildings are managed.
- ◆ Remote monitoring is gaining acceptance.
- ◆ "Sick buildings" — ones with inadequate or poorly-maintained HVAC systems that promote indoor air pollution — have become a major issue.
- ◆ HVAC systems are becoming more sophisticated — until the last five years, most HVAC systems were pneumatically-controlled. They need more maintenance than the new digitally-controlled systems. The new digital systems are capable of monitoring every zone in the building and of changing any zone's temperature.
- ◆ The increase in crime rates is spurring the electronic security system industry to technological development. Systems that use card access control, where a smart card allows access to a door, elevator, or a particular floor are becoming more common. Soon systems that combine card access with closed-circuit TV cameras will be familiar.
- ◆ Lighting systems are being developed that use less energy and produce less heat than conventional sources.

Implications for the apartment industry

- ◆ Apartment managers can explore the use of information technology by considering each apartment management function, and imagining how information technology would change it.
- ◆ Apartment communities will gradually use technology like cable-ready units, closed-circuit TV security, and card-accessed doors as a drawing card for new residents.
- ◆ Information technology will bring new levels of quality, service, and reliability in property management, offering routine and emergency services.
- ◆ A safe strategy is to stay alert to the technological progress being made here and abroad in smart systems. As system costs fall innovations will spread.
- ◆ The apartment industry could contribute to progress; for example, an apartment facility touting a state-of-the-art smart system could attract many residents, as well as generate new R&D in the field.
- ◆ Along with all of their promise, smart technologies and smart structures have potential for problems. The vital nature of smart systems means that the company that uses them needs to have a repair service on call 24 hours a day, or have override systems in place.
- ◆ Smart buildings will be information technology-dense. There should be capabilities in those systems that mesh well with or complement cabling for telecommunications for work at home and other uses.
- ◆ The revolution currently underway in building systems is mainly going on in business structures. This trend could become mainstream in the apartment industry. Prospective residents will soon be asking questions about a building's HVAC systems and the quality of their unit's air. A good security system is already a strong part of many residents' choices of residence. Advanced operating systems will be a competitive advantage.
- ◆ Apartment owners may need to take into consideration the future application of such systems and provide the means to add them later. Options include mechanical chases and cable and wire conduit.
- ◆ When linked to new design or incorporated into rehabbing, smart building technology will most likely pay off in energy savings. Energy efficiency may also pay off in attracting environmentally-conscious renters.

Other developments in science and technology are also important forces in housing construction and management. They are discussed in the next theme.

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554**

In the Matter of
Telecommunications Services
Inside Wiring
Customer Premises Equipment

CS Docket No. 95-184

**DECLARATION OF LAWRENCE G. PERRY, AIA, IN SUPPORT OF
COMMENTS OF BUILDING OWNERS AND MANAGERS
ASSOCIATION INTERNATIONAL,
NATIONAL REALTY COMMITTEE, NATIONAL MULTI HOUSING COUNCIL,
AND NATIONAL APARTMENT ASSOCIATION**

I, Lawrence G. Perry, AIA, declare as follows:

1. I submit this Declaration in support of the Comments of the National Building Owners and Managers Association International ("BOMA"); the National Realty Committee; the National Multi Housing Council; and the National Apartment Association. I am fully competent to testify to the facts set forth herein, and if called as witness, would testify to them.

2. I am a registered architect, specializing in the development of national building codes and standards. As the National Codes Representative for BOMA, I actively participate in the code development process of the three model code organizations: Building Officials and Code Administrators,

International (BOCA National Codes); International Conference of Building Officials (ICBO Uniform Codes); and Southern Building Code Congress International (SBCCI Standard Codes), and I am an active member of several standards-writing committees.

3. I am a member of the International Fire Code Institute and the National Fire Protection Association, where I serve on the Mercantile and Business Occupancy Subcommittee and the Technical Correlating Committee for NFPA 101, The Life Safety Code. In 1995, I earned a Certified Building Official designation from the Council of American Building Officials. I have a total of twelve years of architectural experience, and have operated my own consulting business since 1991.

4. Building and fire codes require that certain building assemblies, including walls, floors, and shafts, provide specified levels of fire resistance based on a variety of factors, including type of construction, occupancy classification (e.g., business or assembly), and building height and area. In addition, fire-resistance rated assemblies are also required to separate areas of greater hazard (such as storage rooms) and critical portions of the egress system (such as exit access corridors and exit stairways). The required level of fire-resistance rating typically ranges between twenty minutes and four hours, depending on the specific application. An assembly used as a fire-resistance assembly must be tested and

shown to be capable of resisting the passage of floor and smoke for the specified time.

5. Over the past ten years, a great deal of attention has been focused on the penetrations of fire-resistance rated assemblies, as these breaches have been shown to be a frequent contributor to smoke and fire spread during incidents. Fire-resistance rated assemblies are routinely penetrated by a wide variety of materials, such as pipes, conduits, cables, wires, and ducts. An entire industry has been built around the wide variety of approaches that must be used to maintain the required rating at a penetration. It is not a simple issue of just filling up the hole -- the level of fire resistance required, the type of materials the assembly is constructed of, the specific size and type of material penetrating the assembly, and the size of the space between the penetrating item and the assembly each factor into determining the appropriate fire stopping method.

6. Forced building entry would grant persons unfamiliar with a building the authority to significantly compromise the integrity of fire-resistance rated assemblies. Persons unfamiliar with the specific construction of a particular building would be unable to accurately assess the types of assemblies they were penetrating, would be unable to determine the appropriate hourly rating, and would therefore be unable to